Updating baseline climate

Good quality climatological information can be used to help public and private sector decision makers to understand their vulnerability to current weather and the threat from climate change. Historical long-term temperature averages are traditionally used as a baseline for planning over the next few years. However, climate is already changing and the past is no longer a good guide for the future or even for present day climate.

Because of warming trends, averages based on the standard 30-year period 1971–2000, centred on the mid-1980s, are often more representative of the 1980s than of present-day climate, and global-mean temperature has increased by about 0.5 ˚C since the mid 1980s over land (in some regions observed increases are substantially larger). The Met Office Hadley Centre has developed new techniques which enable us to provide updated climatologies.

In many parts of the world there is the additional problem that observations are scarce. Improved monitoring is needed to address this in the future, but cannot fill in gaps in past data. Climate models such as PRECIS[1] have been used to supplement incomplete climate records.

ASSESSING ENERGY REQUIREMENTS

The Met Office Hadley Centre was commissioned by the UK energy industry to work with their experts to investigate the potential impacts of climate change on a wide range of industry activities including generation, transmission and energy demand planning (EP2 Project). The energy industry has traditionally used historical data (mainly temperature) to estimate present-day energy demand and to plan for the next 10 years. Other industries use a similar approach: for example the construction industry uses historical climate data to help specify building regulations. Different averaging periods are used, and we have chosen the most recent 15 years as an example.

[1] Providing Regional Climate for Impacts Studies

However, all historical averages are becoming increasingly unrepresentative of present-day climate. To generate improved climatologies, we used our decadal prediction system (DePreSys) to 'extend' the observed historical temperature record into the future for different regions of the UK. The long-term temperature average centred on the current year, or any year in the forthcoming decade, can then be calculated using a mix of observed and predicted temperatures.

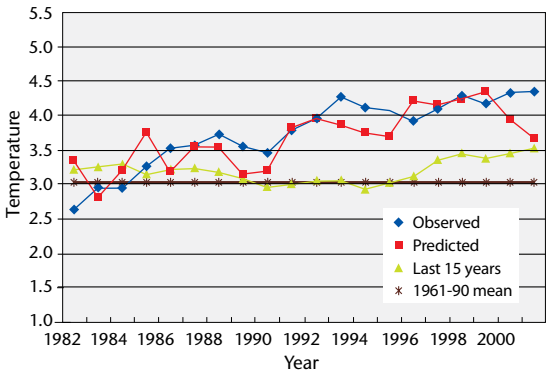
The method has been tested for the UK from the mid-1980s. The benefits are clear. The 1961–1990 January temperature average underestimates present-day expectation for January temperature because climate change has already increased temperatures in the UK. Even the average over the most recent 15-year period underestimates the expectation for present-day temperatures, for the same reason.

The most accurate climatology is provided by constructing averages partly from historical data and partly from DePreSys predictions. Over all regions of the UK and all months of the year, the DePreSys-based predictions of climatology for the test period are at least 20% better than estimates using the 15-year observed averages, and at least 30% better than estimates using the 1961–1990 climatology.

"Historical temperature climatologies are no longer valid because climate is not stationary. The new climatologies that take account of climate change are already being adopted and will improve demand forecasting and planning out to 10 years ahead."

Nick Roberts
EP2 Project Board Chairman

Figure: Observed and predicted January mean temperature climatology (estimated here by 13-year centred averages) for the Midlands (UK), centred on the year indicated, for the test period 1982–2002. The blue line shows the observed averages. The magenta line is the corresponding improved climatology derived by combining DePreSys predictions with observations (in this example data from ten predicted Januarys and three past observed Januarys are used). The yellow line uses the average observed temperature over the last available 15 Januarys to estimate present-day January climate. The brown line is the 1961–1990 climatological average.



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